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TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION
UNIVERSITY FARM ST. PAUL, MINNESOTA

Top-Root Ratio and Size of Top Very Important in Fall-Planted Stock

The balance of planting stock as gauged by top-root ratio based on fresh weight of seedlings proved to be a very important factor, especially in overwinter plantation survival on planting sites with little or no overhead cover on the Hiawatha National Forest.

In fall 1938 and spring 1939 a planting of jack and red pine was established on an open sand-plain area near Cooks, Michigan. The site had no overhead cover and the soil had a silt-plus-clay content of 8 percent for the first foot and 3 to 5 percent for the second foot. The previous cover had been red and white pine. Survivals for the various lots of stock are given in the table below. Each survival figure is based on four replications of 100 trees each. Measurements of stock at time of planting are based on 30 trees of each lot. The rainfall for the growing season was fairly good, except for July when the total rainfall was only 0.90 inch. There were no abnormal temperatures and hence heat injury was not a factor in summer losses.

Species	Age class	Nursery ^{1/}	Length		Stem diameter: 64th inches	Total green weight: Grams	Top-root: ratio by weight	First-year survival	
			Tops	Roots				Fall planted	Spring planted
			Inches	Inches				Percent	Percent
Jack pine	1-0	Wyman	1.3	5.8	4.3	1.2	2.4	90.5	
	1-0	H. S.	3.7	8.2	6.0	3.1	3.0	84.2	
	1 $\frac{1}{2}$ -0	Wyman	3.1	8.5	6.7	2.4	4.2	94.2	
	2-0	H. S.	8.2	11.4	11.4	10.9	5.3	56.4	
	2-0	Hayward	6.8	11.2	8.0	7.2	4.9	93.5	
	1-1	Hayward	4.2	10.6	8.0	6.4	2.5	93.2	
	2-1	Hayward	7.3	10.4	10.5	11.0	2.6	81.8	
Red pine	2-0	Wyman	2.3	9.3	7.9	4.4	3.0	92.7	89.7
	2-0	H. S.	2.9	9.6	8.6	5.4	4.5	91.2	91.0
	3-0	H. S.	6.6	13.1	11.9	16.4	5.4	68.7	82.2
	2-1	Wyman	3.3	9.7	8.4	7.2	2.2	95.7	95.2
	2-1	H. S.	3.6	9.6	9.5	7.9	1.6	90.7	97.0
	2-2	Wyman	5.2	12.1	12.4	22.5	3.2	99.6	99.4
	2-2	H. S.	8.2	14.1	14.8	28.0	2.7	91.0	98.0

^{1/}Wyman Nursery, Manistique, Michigan, Hugo Sauer Nursery, Rhineland, Wisconsin, and Hayward Nursery, Hayward, Wisconsin.

It will be noted that the 2-0 jack pine and 3-0 red pine of poorest balance had lowest survival. The 2-0 jack pine from Hayward and 2-0 red pine from Hugo Sauer show considerably better survival than the poorest balanced lot in each species, but when the weight of top is computed and length of top is considered, it will be seen that this stock had much less top exposed to overwinter loss by desiccation, which was the principal cause of loss in fall planting. On the basis of this experiment and on past field experience it is recommended that tall seedling stock with poor top-root ratio should be reserved for spring planting.

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